PSYCHE.

REVIEW OF THE COLLEMBOLAN GENUS NEELUS AND DESCRIPTION OF N. MINUTUS N. SP.

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The name *Neelus murinus* was given by me* to a curious collembolan that I found in a greenhouse in Cambridge, Mass., under circumstances that indicated Jamaica as its home. The value of the generic characters which I originally drew from a single species is now substantiated through two more forms: "*Megalothorax*" *minimus*, described by Willem† from specimens obtained at the Botanic Garden of Ghent, Belgium, and *Neelus minutus*, a Massachusetts species described below.

The genus Neelus can now be characterized with more detail than it could before, thanks to the additional species. First in importance are the extraordinary development of the thorax, which greatly exceeds the abdomen in length, and the unusual structure of the antennae, as compared with Sminthurus and Papirius — the only other Collembola of globular form. The head is ovate, horizontal or subhorizontal, and broadly articulated. Eyes and postantennal organs are absent. The antennae are short — not more than one half as long as the head — and consist of four simple segments, the second and third of which are incrassate or subclavate. Body globular; prothorax slightly reduced dorsally, mesothorax not reduced, metathorax conspicuously long. Legs long and slender; coxae (fig. 1) especially long; two precoxal segments are evident. Both claws present. The ventral tube is about as long as the antennae and emits a pair of hemispherical papillae. Abdomen swollen before the manubrium; anal tubercle obsolete. Furcula twice as long as the antennae; manubrium stout, distally bifid; dentes cylindrical in lateral aspect; mucrones elongate, serrate or entire. Appendages sparsely clothed with short stiff setae; body almost naked, except anally. Size minute.

Tracheae are apparently absent. The stomach (fig. 2) differs from that of every other collembolan genus in consisting of a longitudinal series of four spherical chambers, partially separated by permanent transverse invaginations of the wall; the intestine, also, becomes spherically, but temporarily, distended by its contents. The food, vegetable detritus, appears through the integument as four or five brown ovoid masses.

*Folsom, J. W. Neelus murinus, representing a new thysanuran family. Psyche, vol. 7, p. 391–392, pl. 8. 1896.

† Willem, V. Un type nouveau de sminthuride: Megalothorax. Ann. soc. ent. Belg., t. 44, p. 7-10, 1 pl. 1900.

Also, Willem, V. Recherches sur les Collemboles et les Thysanoures. Brussels, 1900. (See p 65-68 and pl 15).

The first abdominal ganglion is the last of the chain to be represented and tends to unite with the ganglion of the preceding segment.

As all these generic characters appear, not only in the two species of Neelus found by me, but also in *Megalothorax minimus* Willem, the latter (and later) genus falls. *N. minimus*, unlike the other two species, has three pairs of small cuticular cupules, and the attitude of the head, as figured by Willem, is more nearly vertical — an attitude, however, that occurs at times in the other forms; finally, the segmentation of the body (obscure in *murinus* and *minutus*) is pronounced in *minimus* — a difference also found within the allied genus Sminthurus. With this last genus, Neelus should be compared, although it may be stated at the outset that the differences between the two are much greater than those that separate Sminthurus and Papirius.

As contrasted with Sminthurus, then, the head of Neelus is articulated by its entire base, without a projecting vertex, higher than the neck. The antennae, in particular, instead of being longer than the head and slender, are but half as long as the head and have stout segments, the last of which is not annulate, as it is frequently, although not always, in Sminthurus. The thorax, far from being condensed, with the legs brought together, is much more extensive than the abdomen — an essential difference — and the legs are well separated. The metathorax is remarkably long and the coxae as well. Again, the ventral tube is long, of peculiar form, and does not extrude long filamentous tubes. There is no prominent anal tubercle in Neelus. The stomach is divided into spherical compartments, instead of being cylindrical as in Sminthurus. Other differences, of minor importance, exist but need no mention.

Neelus should, however, be assigned to one family with Sminthurus and Papirius, notwithstanding my earlier opinion, and clearly becomes the most primitive genus of Sminthuridae. In Willem's (1900, p. 67) words:

"*Megalothorax* [Neelus] est un Sminthuride qui a conservé les caractères archaïques suivants:

1. la forme des antennes;

2. le développement du thorax, dont seul le premier anneau a subi une légère régression;

3. la persistance très nette de la segmentation abdominale; [this applies to species *minimus* only, at present.]

4. la netteté des deux articles précoxiens des pattes;

5. la simplicité de l' appareil reproducteur mâle.

C'est donc, sous bien des rapports, le plus archaïque des Sminthurides: il s'est séparé de la souche du groupe avant *Prosminthurus* [of Willem] et *Sminthurus*.

Il offre comme spécialisations secondaires:

a. la disparition des yeux;

b. les trois cupules sensorielles; [applies to *minimus* only.]

c. la diminution de volume de l'abdomen, plus ramassé que chez *Sminthurus*;

d. l' absence d' appareil trachéen;

e. la structure spéciale de l' intestin moyen."

The break between the Sminthuridae

and the cylindrical Collembola is partially bridged by Neelus, which, quite unlike Sminthurus and Papirius, agrees with the Poduridae in respect to the form of the antennae, the articulation and position of the head, and the form of the papillae emitted by the ventral tube.

The three species of *Neelus* may be separated as follows:

Segmentation pronounced; superior claw untoothed, with a basal pair of subulate-processes (*pseudonychiae* of Tullberg); dentes untoothed; mucro sublinear, entire; three pairs of cuticular cupules present, on mesothorax, metathorax and fourth abdominal segments, respectively; brown; maximum length, 0.25 mm. *minimus*.

Segmentation obscure; superior claw unidentate; dentes toothed or spined; mucro lanceolate in lateral aspect, and serrate; cupules absent.

Superior claw with a basal pair of linear processes (pseudonychiae); inferior claw linear-lanceolate; dentes five-toothed; ochraceous-buff; maximum length, 0.7 mm. . *murinus*.

Superior claw not pseudonychiate; inferior claw lanceolate or oblong-lanceolate; dentes six-spined; bluish gray; maximum length 0.56 mm. *minutus*, n. sp.

Neelus minutus I have found at only one spot, an old pine forest in Arlington, Mass., in rich black soil, perennially damp. The species easily escapes ordinary observation on account of its small size and dull color and I took only about two dozen examples during four years of continual search. One specimen occurred under the loose bark of a white oak log; the others were on the under side of dead sticks or else in the soil. Minute white individuals, scarcely discernible, appear early in July; full grown specimens occur in the middle of that month, are most numerous in mid August and persist, in constantly decreasing numbers, even into December, long after the frosts have begun.

Neelus minutus n. sp. (Plate 2, figs. 3–11). — General color bluish gray, — the combined effect of bluish mottlings and a pale ground color (fig. 3); sternum colored; appendages white, excepting a little color on the bases of the legs of large individuals; the amount of coloration increases with the size, young specimens being white. Head horizontal, ovate. Eyes and postantennal organs absent. Antennae (fig. 4) less than half as long as the head; ratio of segments, 2: 3: 6: 5; second segment incrassate, simple or with a ventral lobe; third incrassate; fourth conical. Body oval in dorsal aspect, with smooth contour, showing scarcely a trace of segmentation above. Thorax one and one half times as long as the abdomen. Claws small; first and second pairs of superior claws (fig. 5) slightly curved, uniformly tapering, unidentate; first pair of inferiors lanceolate, simple, one third as long as the opposed claws; second pair similar but a little longer; third pair of superior claws (fig. 6) broad basally, unidentate; third pair of inferiors oblong-lanceolate, simple, extending almost as far as the opposite claws; pseudonychiae absent. Ventral tube (figs. 3, 7, 8) subclavate with a posterior lobe near the base. Manubrium (fig. 9) stout, slightly shorter than the dentes, bifid (fig. 10); dentes in lateral aspect (fig. 9) cylindrical, in dorsal view (fig. 10) tapering, with two mesal and four lateral spines; mucrones

(figs. 9–11) five sixths as long as the dentes, lanceolate from the side, linear from above, serrate with entire apex. Head and body naked, excepting a few stiff anal setae; appendages sparsely clothed with minute stiff setae. Maximum length, 0.56 mm.

Described from twenty-one types, some of which have been given to the Museum of Comparative Zoölogy at Cambridge, Mass.

EXPLANATION OF PLATE II.

Neelus murinus.

Fig. 1. Left aspect of left hind leg, × 118.

Fig. 2. Diagram of a sagittal section showing the peculiar alimentary canal of the genus, × 118.

Neelus minutus, n. sp.

Fig. 3. Lateral aspect, × 122.

Fig. 4. Lateral view of left antenna, × 506.

Fig. 5. Right aspect of right fore foot, × 1008.

Fig. 6. Right aspect of right hind foot, × 1008.

Fig. 7. Ventral tube as seen from the left side, × 269.

Fig. 8. Ventral tube showing exsertile papillae, × 448.

Fig. 9. Furcula. × 269.

Fig. 10. Furcula, from above, × 224.

Fig. 11. Right aspect of left mucro, × 605.

MICRODON LARVAE IN PSEUDOMYRMA NESTS.*

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The larvae of the Syrphid flies belonging to the genus Microdon are of peculiar interest to the entomologist both on account of their occurrence in ant nests and because of their remarkable appearance which is more like that of slugs, planarians or scale-insects than Dipteron larvae. In Europe they have long been known to occur in the nests of several Formicidae and even in the nests of Vespa crabro.†

Wasmann‡ records the occurrence of the larva and pupa of *Microdon mutabilis* L. with *Formica fusca*, *F. rufa*, *F. rufibarbis*, *Lasius niger*, *L. brunneus and L. flavus*, and of *Microdon devius L.* with *F. fusca*, *F. sanguinea*, *F. rufa and L. fuliginosus*. Adlerz§ found a species in the nest of *Camponotus herculeanus*. In the United States Microdon larvae are occasionally found with *Camponotus pennsylvanicus* and *Formica integra*, and a care-

* Contributions from the Zoological Laboratory of the University of Texas, No. 20.

† Wasmann. Vergleichende Studien ueber Ameisen gaeste und Termitengaeste Tijdschr. voor Entomol. Bd. 33, 1890.

‡ Kritiches Verzeichniss der myrmekophilen und termitophilen Arthropoden. Berlin 1894 pp. 173 and 175.

§ Myrmecologisker Notiser. Entomol. Tidskrift 1896 pp. 131–132.)